

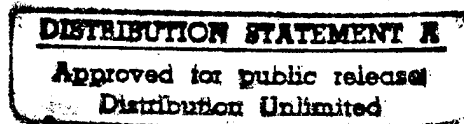
## **Quarterly Technical Report**

### **Netbook - A Toolset in Support of a Collaborative and Cooperative Learning Environment**

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**April 26, 1996**



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**The First Quarter of 1996**

**MDA972-96-C-0004**

**Prepared for:**

**ARPA/ITO**

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### **Abstract**

Netbook is a software development/research project being conducted for the DARPA computer aided training initiative (CEATI). As a part of the SNAIR division of CAETI, Netbook concerns itself with the management of Internet resources. More specifically, Netbook is a toolset that allows students, teachers, and administrators to navigate the World Wide Web, collect resources found there, index and annotate those resources, and then organize them in a meaningful way. In addition Netbook provides the capacity for communication with peers and teachers, enabling students to collaborate while engaged in the aforementioned activities. For the first quarter of 1996, the functional specifications for Netbook were defined. This process involved developing a real-world scenario and then defining the components needed for its realization. The major issue that arose in the development of the functional specification surrounded deciding whether Netbook's tool suite would be integrated and structured, or separated and flexible. Because of the particular needs of the audience and an attempt to reduce the learning curve, among other issues, it was decided that an integrated and structured Netbook would add greater value to the research process, and that greater flexibility could always be built in should the Netbook project be extended for future development. In the following quarter Netbook's system architecture will be defined, various components will be coded, and early formative evaluations will begin.

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## **1. Summary**

The Netbook software project, which is a collaborative effort between Odyssey Research Associates and the Interactive Media Group at Cornell, represents an effort to develop the tools needed to manage the explosion of publicly available digital information. In its final stage Netbook will be a prototype application that allows users to cooperatively collect and organize online information. The first quarter of 1996 was spent defining Netbook's functional specifications which involved the development of a detailed description of Netbook's workings and interfaces. In the second quarter of 1996, Netbook's system architecture will be defined, the coding will begin, and some preliminary formative evaluations will be carried out.

## **2. Introduction**

The quantity of information available on-line has increased enormously in recent years, as have the number of tools available to access that information. Yet there has not been much growth in the availability of tools designed to structure this information in relevant and meaningful ways. Without tools of this type students and faculty members are often unable to make full use of the available information, and frequently feel overwhelmed by the vast unstructured resources available online. The Netbook project is being developed by Odyssey Research Associates and the Cornell Interactive Media Group to address these issues.

The general purpose of the Netbook project is to add value to the information available online for both students and faculty members, by developing a collaborative environment within which that information can be effectively structured. The end product will be a prototype tool, the Netbook, that provides users with the capacity for cooperating in cross-application retrieval and organization of digital information, within a networked educational environment. In addition to facilitating the collection of materials, the tool encourages customization over the search and re-organization of retrieved materials. The Interactive Multimedia Group at Cornell has been studying how students and faculty members retrieve materials from small multimedia databases, and how such users collaborate within a digital environment. The results of these initial studies will assist in better anticipating users needs in larger digital libraries and in informing the further design of prototype tools.

The Netbook tool will allow users to:

- navigate online databases
- structure their searches
- select entire text documents
- select portions of text
- select entire images
- select portions of images
- title and annotate their selections
- arrange and organize collected information
- save the information regarding their selections (titles, annotations, and pointers to their selected materials) onto a single floppy disk print

## **3. Methods, Assumptions, and Procedures**

Work on Netbook began on February 8, 1996. At that time Odyssey Research Associates began the process of acquiring the employees needed to support the development of Netbook. This resulted in the addition of one new computer scientist to the Odyssey Research Staff on March 19, one day prior to the CAETI Developers Conference. The CAETI conference was attended by both ORA and Cornell's Interactive Media Group.

The primary activity for the first quarter of 1996 was the development of a comprehensive functional analysis. This involved identifying all of the functional components, defining their behaviors, defining how the components interface with one another, and how they interface with the end-user. There were

two primary constraints guiding the definition of these elements: the environment in which they will be implemented, and the scope of the Netbook project (the predefined time-frame and resources available). Also, since the scope of the Netbook project may one day be expanded, the Netbook development team identified future Netbook issues.

The first stage of the functional analysis required the development of a real-world scenario around which the Netbook "vision" could be constructed. This approach was chosen based upon the following assumptions: a large part of Netbook's success will depend upon the ease with which it can be integrated into its operating environment, which requires the minimization of disruptions; any training required to implement a tool is considered a disruption; additional administrative requirements demanded by a tool is disruptive; any change required of the existing content, i.e. curricula, required to implement a tool is disruptive; that initiative to utilize and learn a tool will be proportional to its perceived benefits; and finally, that developing the software around an appropriate scenario, as opposed to a generic set of functional specifications, will ensure that disruptions are kept to a minimum, and that perceived benefits are maximized.

Once the scenario was developed the next step was to identify the functional components necessary to realize it. Each of these components were then further refined, both individually and as a unit. The final result of this process yielded an illustrated document that contained the following information for each component: a definition of its purpose; a description of how it functions; an identification of the other components it interfaces with; how it interfaces with the other components; and how it interfaces with the user. In addition, the major data inputs and outputs were identified.

#### **4. Results and Discussions**

Whether to develop Netbook as an integrated and structured environment or as an unintegrated and flexible environment was the primary issue that guided the decisions that followed. Offering the Netbook tool suite in an unintegrated and flexible environment would have several advantages: it would allow users to create their own organizational structure by customizing the "interactions" between different functions, and even different applications. This would mean a greater number of data sources available for collection as well. On the other hand, because such a tool suite involves separate components, it would require mastering each component individually and learning how to get each one to interact with other components and applications. This would add a significant burden to the learning curve and would require the characteristics of patience and initiative from Netbook users, as well as additional time. Those not possessing these characteristics would undoubtedly demand a considerable amount of external guidance.

An integrated and structured environment would decrease the learning curve and demand less from the user, by combining all functionality into a single unified working environment. Within this environment the combination of tools would appear to be one tool, with the available interactions and organizational schemes already defined for the user, requiring less to learn, and less effort to implement. This would mean less external guidance needed for each user as well. However, these benefits would come at the cost of a more restricted combination of interactions between applications, and a narrower choice of organizing schemes, effectively limiting the collection resources available, and how they can be structured.

This issue had a direct bearing upon subsequent decisions in the functional analysis. An integrated approach would demand a single development environment that is capable of either developing all of the desired functionality, or acting as a front-end to the development environments that are capable. A less structured approach would allow for a broader range of development environments, but demand greater effort to ensure compatibility with the components and applications with which they would interact.

#### **5. Conclusions**

Upon investigating the various options for Netbook, it was decided that an integrated structured approach would be the most advantageous. The unintegrated approach would introduce more "disruptions", as defined earlier, into the implementation environment, than the integrated approach would. In addition assumptions about the target audience for Netbook (middle- and high school students and teachers) were made regarding the general level of initiative, maturity, and need for guidance, as well as the time needed

to master the software, all indicated that a structured approach would be more beneficial. But most important was the notion of adding value to the functions Netbook provides. Almost all PC computers come equipped with the tools to perform all of the individual functions within Netbook, and the ones that aren't can be acquired as freeware or shareware. A moderately sophisticated user would be able to coordinate the functions of these individual applications without Netbook to perform the same tasks. Thus, creating Netbook as an unintegrated suite of tools would merely be duplicating the work of others, while still requiring the same level of sophistication from the user. In order to add value to the processes, Netbook needs to frame these functionalities within the scope of a the appropriate paradigm that is specific to the implementation environment. In addition, the organization and collection flexibility is something that can be expanded upon if Netbook goes through future iterations. Therefore, the vision of Netbook that was developed was one with an integrated environment housing all the functional requirements necessary for collaboratively collecting and organizing online information within an educational setting.

## **6. Recommendations**

The next steps in the Netbook project will be to use the functional analysis as a blueprint in defining Netbook's system architecture, to code a portion of the project, and to perform some early formative evaluations. The system architecture will be defined by May 15. Coding will begin May 15, and several independent functional components will be evaluated throughout the month of June, beginning June 12. Coding will continue through August when a working prototype will be ready for display at the next CAETI developers conference.

Netbook's primary development environment will be Visual Basic 4.0 Enterprise Edition. Other tools are still being explored for use with Visual Basic.

## **7. References**

## **8. Appendices**